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Transfer of environmentally sound technologies, cooperation and capacity-building

Environmentally sound management of biotechnology*

Report of the Secretary-General

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I. Introduction

1. The present report reviews changes, accomplishments and constraints with regard to the transfer of environmentally sound technologies and the sound management of biotechnology. It examines how, since the United Nations Conference on Environment and Development, technology transfer has come to be understood in new ways, and how the accelerated pace of technological development and uncertainties regarding the benefits and problems of biotechnology have made it an issue of global concern in a very short time. The report considers the contribution of each to sustainable development.

II. Transfer of environmentally sound technologies, cooperation and capacity-building

2. Work on the topic of environmentally sound technologies and cleaner production has focused largely on industrial technologies. There has also been work on the development and transfer of technologies for sustainable development in the fields of agriculture, health, water, urban management, energy and transportation. Those areas will be addressed in other reports.

A. Approaches to environmentally sound technologies

3. Agenda 21 defines environmentally sound technologies as technologies that "protect the environment, are less polluting, use all resources in a more sustainable manner, recycle more of their wastes and products, and handle residual wastes in a more acceptable manner than the technologies for which they were substitutes".[1] It states that they "are not just individual technologies, but total systems which include know-how, procedures, goods and services, and equipment as well as organizational and managerial procedures".[2]

4. With this definition, the Commission on Sustainable Development and many other national and international organizations have concentrated their efforts on the identification of industries and economic sectors to which technology substitutes could be transferred and on the identification of technologies to be transferred. The focus of the work has not been on the development of environmentally sound technologies but on promoting access to them and assisting in their integration and use, through information, education and financing, taking into account the national contexts in which they are to be used.

5. Until the 1990s, most of the work on environmentally sound technologies focused on the development and transfer of "end-of-pipe" technologies for removing harmful substances from emissions and effluents and treating them or disposing of them safely. During the 1990s, the focus shifted to cleaner production, reducing or eliminating the generation of harmful substances in the production process. The concept of cleaner production, launched by the United Nations Environment Programme (UNEP) in 1989, promoted the shift from end-of-pipe to cleaner production solutions. The shift has subsequently been reflected in the emergence of a variety of new concepts, including pollution prevention, eco-efficiency, factor 4 and factor 10.

6. The focus on cleaner production has been strengthened by the recognition of the profitability of cleaner production, which can generate financial benefits for the enterprise both directly, through reduced costs for raw materials, waste treatment, insurance and liability, and indirectly, though green marketing and better public relations. These financial benefits, which are increasing as environmental protection policies are strengthened and environmental costs internalized, are being identified and quantified through new management and accounting systems such as environmental management accounting and environmental management systems. In other cases, the introduction of cleaner technologies may not be profitable to the enterprise but may still be justified economically, based on the external environmental benefits.

B. Government policies and strategies

7. Long-term studies in many countries suggest that advances in technology have been responsible for at least half of long-term economic growth, through improvements in capital and labour productivity and the introduction of new processes, products and services. To promote technological development actively, some countries have started to develop

national technology strategies, including a consideration of cleaner technologies. These strategies focus on three complementary goals:

(a) Building industries that are competitive in both domestic and global markets and that contribute to sustainable development;

(b) Establishing business conditions attractive to technology-oriented investment, including foreign investment, technology transfer and managerial know-how;

(c) Promoting public/private research and development partnerships to promote adaptation, commercialization and spin-off of cleaner technologies.

International assistance, such as that provided by the Department of Economic and Social Affairs, United Nations Secretariat, has supported the development of these new strategies.

8. The transfer of cleaner technologies to developing countries has been most effective when it has been driven by demand from enterprises in those countries. The demand depends to a large extent on national policies for sustainable development. In general, countries with strong environmental policies have benefited from more technology transfer and more rapid economic growth than countries with weak environmental policies.

9. Successful environmental policies supporting the transfer of cleaner technologies have generally been based on flexible approaches that include economic incentives and technical assistance to enterprises, as well as regulatory measures. Such flexible measures have been effective in promoting more productive cleaner technologies, rather than more costly "end-of-pipe" pollution abatement measures.

10. A growing number of countries, often with assistance from international organizations or donor countries, have established national cleaner production centres. These centres, most of them created under the programmes of the United Nations Industrial Development Organization (UNIDO)/UNEP, the World Environment Center (WEC) and the United States Agency for International Development (USAID), assist national enterprises in acquiring and incorporating cleaner production methods through training, technical assistance, demonstration projects and contacts with sources of cleaner technologies. Such centres have been an effective means for the transfer of cleaner technologies both internationally and within countries, particularly for small and medium-sized enterprises.

11. The development of government policies to promote the transfer of environmentally sound technologies, such as financial incentives, has been limited by a lack of assessment tools for identifying technologies as environmentally sound technologies. Environmental soundness is largely relative to the technologies currently in use, which the new technologies are intended to replace. The classification of technologies as environmentally sound therefore differs among countries and evolves over time. Tools and skills for applying the new "environmental verification of technologies" and "environmental technology assessment", which have been developed to assist in assessing the environmental soundness of technologies in specific contexts, are not yet widely available in developing countries.

C. Financing technology transfer and international cooperation

12. While investment in cleaner production may be profitable for an enterprise and beneficial to society, financing such investment may pose problems. Investment capital for cleaner production may be unavailable, either because the returns are not fully recognized or because the enterprise does not have access to credit. In addition, there may be public benefits that are not reflected in revenues to the enterprise.

13. A large number of funds and programmes have been created by donors, international financial institutions and others to promote the transfer of environmentally sound technologies on terms and conditions more favourable than those available in commercial financial markets. Such programmes include assistance through grants, special credit lines, lower interest rates, technical assistance, reduction of licensing fees or property rights, and training. In addition, the share of official development assistance (ODA) allocated to environmental protection has grown substantially, increasing the available funding for technology transfer from that source.

14. Several international environmental agreements, including the United Nations Framework Convention on Climate Change, the Montreal Protocol to the Vienna Convention on the Protection of the Ozone

Layer, and the Convention on Biological Diversity, include provisions for new and additional financial assistance to support the transfer of environmentally sound technologies. Such assistance — provided, for example, through the Global Environment Facility and the Multilateral Fund of the Montreal Protocol — has been instrumental for many developing countries in obtaining cleaner and more advanced technologies. The Clean Development Mechanism of the Kyoto Protocol to the United Nations Framework Convention on Climate Change may be an important source of finance for the transfer of cleaner technology but needs to be elaborated.

15. Despite the new funds and programmes, there is not enough financial assistance available to support the technology transfer required to prevent environmental degradation resulting from industrial development and increased consumption.

16. However, some of the funds available to support transfer of environmentally sound technologies are not being used as fully and effectively as they could be, due to limited capacity for investment planning that combines financial and environmental assessment. There are substantial sums of money seeking good projects and not enough well developed project proposals for the funds. In addition, information on available funds, assistance programmes and conditions is not easily accessible, limiting the ability of enterprises and agencies to obtain support.

17. Furthermore, international assistance for the transfer of technology is often supply-driven, thus limiting its effectiveness in addressing the priority concerns of receiving countries. A shift to a more demand-driven approach is being pursued by certain receiving countries through improved planning mechanisms and domestic capacities, better to match national economic, social and environmental priorities with available international support. The success of these efforts by receiving countries depends, in part, on a similar shift in policy by the sources of international assistance.

D. Foreign direct investment, trade and technology transfer

18. The transfer of cleaner production technologies is largely a business-to-business operation, and technologies are constantly being transferred through foreign direct investment (FDI), trade and other business transactions. However, not all foreign direct investment involves technology transfer, and not all of the technology transferred is environmentally sound. There is no agreed way to assess the amount of technology transferred or the percentage of that technology that is environmentally sound.

19. Nonetheless, there is general agreement that the rapid growth in trade and foreign direct investment in recent years, as part of the globalization process, has been accompanied by an increase in technology transfer. Global FDI inflows reached $865 billion in 1999, a four-fold increase from the 1988-1993 average. Of that total, $208 billion has gone to developing countries, up from about $47 billion for 1988-1993.[3] The main sources of FDI are large transnational corporations from developed countries with strong research and development efforts, with the need to amortize the cost of that research over as wide a market as possible.[4] The work of the United Nations Conference on Trade and Development in this area has contributed to integrating sustainable development into FDI and the activities of transnational corporations.

20. Stronger environmental standards in both developed and developing countries, expanding markets for green products, and increasing public pressure for improved environmental performance by business also contributed to increases in the transfer of cleaner technologies through business transactions. An increasing number of multinational corporations are adopting global environmental standards for all of their operations and those of their suppliers.

E. Information systems and technologies

21. Agenda 21 stresses the need for the development and linking of information systems to support the transfer of environmentally sound technologies. Since the United Nations Conference on Environment and Development, a large amount of information on cleaner technologies has become available, and a large number of information systems on such technologies have been established by both United Nations agencies and other international and national organizations. Those systems lack the networking needed to reach their full potential for information dissemination.

22. The development of the Global Information Network on Cleaner Production, together with the

existing European Good Environmental Practices Network, and the new Information Network of Cleaner Production Centres and the Sustainable Alternatives Network, currently under development, promise to improve accessibility of information on cleaner technologies.

23. Advances in information and communication technologies, in particular the development of the Internet, have been central to the process of globalization. While the new information and communication technologies can certainly contribute to economic development and environmental protection by improving the efficiency of production and distribution, their overall impact on the environment is not yet clear. E-commerce, for example, both retail and business-to-business, is growing rapidly and opening new markets for businesses in both developed and developing countries. However, studies indicate that the new production and distribution systems based on the Internet and other information systems can either reduce environmental impacts, particularly through reductions in storage and retail space, or increase them, particularly through more energy-intensive transportation. There are also concerns that increased use of advanced information and communication systems may further marginalize countries, communities and enterprises that are not well connected to information networks.

III. Environmentally sound management of biotechnology

24. This section of the report focuses on progress in establishing enabling mechanisms for the development and the environmentally sound application of biotechnology.

25. The advent of molecular biology in the mid 1970s and what became known as the "new" biotechnology (henceforth referred to as "biotechnology") promised great opportunities for addressing major development problems. Improved health care, enhanced agricultural productivity, cleaner energy and environmental protection were among the goals of biotechnology.

26. Agenda 21 recognizes the potential contribution of biotechnology as a tool for sustainable development, with applications in five areas:

(a) Increasing the availability of food, feed and renewable raw materials;

(b) Improving human health;

(c) Enhancing protection of the environment;

(d) Enhancing safety in the use of biotechnology and developing international mechanisms for cooperation;

(e) Establishing enabling mechanisms for the development and the environmentally sound application of biotechnology.

27. Ten years after Rio, biotechnology has developed into an economically important industry, but most of the benefits foreseen for sustainable development have not been realized. In some industrialized countries, biotechnology is a profitable field that plays a strategic role in enhancing national competitiveness in a global economy, although concerns about its risks are growing. For the developing world, biotechnology is still awaiting the fulfilment of the early social and economic expectations.

28. Biotechnology, like other strategic technologies, has been driven by commercial imperatives, and the capital requirements for product development and regulatory approval are often substantial. Investment capital for development and commercialization has been available mainly through private venture capital in the advanced industrialized countries. As a result, innovation has been dominated by the private sector and is increasingly proprietary and thus mostly unobtainable by the large majority of developing countries. Technology development and transfer to developing countries have been further hindered by a scarcity of human and financial resources and the drastic decline in public funding for indigenous research and development.

29. In view of these constraints, only a few of the larger developing countries have an incipient biotechnology capacity. For the large majority of developing countries, the United Nations system and other international technical assistance agencies remain the main conduits of technology transfer. Since the Conference on Environment and Development, efforts through several international programmes have resulted in some biotechnology products and processes, particularly in health and agriculture. However, their impact for economic and social development has been limited, due to declining donor budgets, changing

donor priorities and unequal relations between industrial and developing partners in existing collaborative activities.

30. Private-sector investment in biotechnology will not only drive innovation and product development but can also promote economic growth in developing countries. Public and non-profit institutions will remain important in promoting the broader, non-commercial goals of biotechnology. Indeed the major challenge now is to find the means to develop biotechnology-based public goods while maintaining corporate incentives for biotechnology innovation.

31. Biotechnology raises important ethical and social issues. These include equitable distribution of benefits, biosafety, and responsibility to future generations. The impacts cannot easily be confined within national boundaries and will often differ among countries, depending on local ecological, social and economic situations. Efforts are now under way to address urgent issues, including: strengthening the capacity of developing countries to acquire and integrate biotechnology safely into sustainable development programmes; providing forums for private and public institutions and civil society to consider policy options and discuss controversial issues at national, regional and international levels; and establishing innovative mechanisms and special funds for research on the critical needs of poorer countries.

Notes

[1] *Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992* (United Nations publication, Sales No. E.93.I.8), resolution 1, annex II, para. 34.1.

[2] Ibid., para. 34.3.

[3] *World Investment Report 2000* (Geneva, UNCTAD, 2001), p. 283.

[4] *World Investment Report 1999* (Geneva, UNCTAD, 2000), p. 199, pp. 203-228.